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☐ 1. Document ID: US 6625643 B1

L48: Entry 1 of 1 File: USPT Sep 23, 2003

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TITLE: System and method for resource management on a data network

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INVENTOR-INFORMATION:

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PARENT-CASE:
CROSS-REFERENCE TO RELATED APPLICATIONS This application claims the benefit of U.S. Provisional Application No. 60/108,326, filed Nov. 13, 1998 and U.S. Provisional Application No. 60/108,597, filed Nov. 15, 1998.

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U.S. PATENT DOCUMENTS

PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL

h e b b g e e e f e g ef b e

5930473	July 1999	Teng et al.	709/204
6058424	May 2000	Dixon et al.	709/226
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6385647	May 2002	Willis et al.	709/238

ART-UNIT: 2155

PRIMARY-EXAMINER: Jean; Frantz B.

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ABSTRACT:

A broadcast manager automatically commits resources and sets up network interconnections to produce a broadcast session on a data network. The broadcast manager automatically monitors usable network resources, tracks current data streams in the data network and tracks network resources that are used,by the current data streams to determine how resources are to be allocated. A system constructed according to the, invention may be used to provide multimedia distribution service that enables publishers to register multimedia presentations with the service and enables viewers to view these presentations.

12 Claims, 6 Drawing figures

Term	Documents
(1 AND 47).USPT.	1
(L47 AND L1).USPT.	1

h e b b g e e e f e g ef b e

09/521,308

(2)

First Hit Fwd Refs

☐ Generate Collection Print

L23: Entry 1 of 6 File: USPT Sep 23, 2003

DOCUMENT-IDENTIFIER: US 6625643 B1
TITLE: System and method for resource management on a data network

Abstract Text (1):
A broadcast manager automatically commits resources and sets up network interconnections to produce a broadcast session on a data network. The broadcast manager automatically monitors usable network resources, tracks current data streams in the data network and tracks network resources that are used,by the current data streams to determine how resources are to be allocated. A system constructed according to the, invention may be used to provide multimedia distribution service that enables publishers to register multimedia presentations with the service and enables viewers to view these presentations.

Brief Summary Text (2):
The invention relates to data networking and, more specifically, to a system and method for scheduling data streaming services and allocating associated system resources in a distributed data network environment.

Brief Summary Text (5):
Initially, the Internet was primarily used to transmit and receive electronic mail and network news and to allow transfer of computer files. However, since the introduction of the World Wide Web (also known as the "Web" or "WWW") several years ago, the Internet has begun to host increasing amounts of other types of data of general interest, namely representations of images and articles, audiovisual and multimedia content, etc.

Brief Summary Text (7):
In recent times, the Web has begun to host highly sophisticated types of multimedia content, such as audio and video data, and computer software. Compared to first generation Web content, namely text and still images, audio clips, video clips, and software programs have extremely high storage and bandwidth requirements.

Brief Summary Text (14):
Moreover, such methods of providing streams can be profoundly expensive at any level of data rate. The optimal configuration would be to know exactly how many streams are required to support the program for the attending audience. It's like building airliners for just the number of travelers of that day. If this were possible, airline travel would be significantly cheaper. Similarly, a unicast network configuration would also benefit with this type of planning optimization.

Brief Summary Text (16):
Conventionally, broadcast events are not effectively managed. For example, a broadcast stream may be accessible to anyone who logs into an associated Web page. Thus, there may be no control over who accesses the stream and there may be no control over how many people access the stream. In this example, the quality of the broadcast may suffer as a result of a degradation in the performance of the server that provides the stream. Accordingly, a need exists for an improved method of managing broadcast events over a data network.

Brief Summary Text (18):

The invention is directed to a system and method for managing the broadcast of data over a data network. To provide services for a scheduled broadcast event, a broadcast manager automatically commits system resources and sets up network interconnections for the broadcast. For example, the broadcast manager may automatically monitor usable network resources to determine which resources can be allocated. The broadcast manager may also track current data streams in the data network and track network resources that are used by those current data streams to determine how resources are to be allocated.

Brief Summary Text (19):
In one embodiment, a system constructed according to the invention provides multimedia distribution service that enables publishers to register multimedia presentations with the service and enables viewers to view these presentations. Network servers are provided for the publishers to load the presentations for viewing. Publishers can specify when a presentation is to be accessible. Publishers can specify which viewers are allowed to view the presentations. Viewers may log into the service using standard web browsers to view the presentations.

Drawing Description Text (5):
FIG. 3 is a flowchart illustrating stream resource allocation operations that may be performed by a system constructed according to the invention;

Detailed Description Text (3):
FIG. 1 provides an overview of the main components of one embodiment of a system incorporating the teachings of the invention. A Topology Manager 20 manages broadcast events that are served from Data Stream Servers 22 to User Terminals 24 over a Data Network 26 such as the Internet. In one embodiment, the Topology Manager is a redundant set of software components that run on one or more Windows NT Workstation systems. The Topology Manager, using information obtained from a Scheduler 28, automatically commits resources and sets up network interconnections to produce a broadcast session on the system network. To track and allocate resources, the Topology Manager stores resource and event information in a Database 30.

Detailed Description Text (5):
The Topology Manager performs several tasks, including the following: 1. The Topology Manager tracks all publisher streams currently on the system and the system resources they consume. 2. The Topology Manager tracks all usable resources in the system. 3. The Topology Manager receives new publishing point information from the Scheduler and wires the necessary resources into a network to publish the streams as specified by the publisher. 4. The Topology Manager creates a web page directory for PowerVU presentations and returns the URL and ftp information. It clears the directory after the presentation is complete or canceled. 5. The Topology Manager schedules the Title Managers and directs content to them. 6. The Topology Manager sets the presentation name URL in the Name Server to point to one or more video servers and web servers as needed. 7. The Topology Manager configures a Recaster and/or Firewall Tunnel if needed. 8. The Topology Manager starts and terminates the presentation.

Detailed Description Text (18):
Each Topology Manager program will send the other Topology Managers `HereIAm` messages at a configurable time interval. Should a configurable number of these messages be missed, the lowest numbered running Topology Manager will perform a connection check to assure that it is still in contact with the Scheduler and most of its resources. If this test passes, that Topology Manager will assume the operation of the current in-progress scheduling operation, if there is one, and inform the Name Server to redirect any messages to it. The Topology Manager will also maintain communications with all manager programs of any resources that it has allocated for connections using the same mechanism. Should that resource manager fail to respond, the topology manager will attempt to reestablish the connections

to other resources.

Detailed Description Text (20):
All operation request messages will be answered by an operation acknowledge message by all resource managers. The operation will be assumed to be complete when the acknowledgement message is received. Each Topology manager forwards each operation request and acknowledge message to the other Topology Managers in a `forward` message wrapper. The other Topology Managers use the messages to update their databases and track the completion of operations by the originating Topology Manager. An original operation request may be sent to any Topology Manager at any time. It will be processed by the original receiver and forwarded to the other Topology Managers for tracking.

Detailed Description Text (25):
The Topology Manager has a database table listing all resource controlling manager programs, the types of resources they control, and their 1P address or names. The Topology Manager will create tables of resources by polling the managers to see which are available. It will then request and receive resource report messages from them. It will create resource table entries from these report messages. The Topology Manager will mark the resources used as it assigns them to a scheduled event. It will free the resources at the conclusion or cancellation of the event.

Detailed Description Text (26):
The Topology Manager tracks the operation of any manager that it has assigned resources. It will receive and track the status fields of `HereIAm` messages from each of these managers. If a manager fails to send a `HearIAm` message before the assigned time out period or if the received `HearIAm` message has a status field indicating an operation error, the Topology Manager will request resources from other managers and assign them to the event where it can. It will mark the previous resources as out-of-service until it receives a clear status from the manager of the resources.

Detailed Description Text (28):
The Topology Manager assigns the resources in the order that it has them in the resource tables. If it cannot fill the resources required for a scheduled event, it will schedule as many as it can for the event and return an error in the acknowledgment to the scheduler. It will also post an error status to the operator user interface.

Detailed Description Text (33):
The web based manual interface will allow the operator to view the status of all resources available to the Topology Manager. It will allow the operator to view the status of any scheduled event.

Detailed Description Text (34):
The web based manual interface will allow the operator to view and edit any database table in the resource and event database tables. It will allow the operator to add managers to the resource manager tables and manually instruct the Topology Manager to poll them for available resources to add to the resource tables. It will allow the operator to remove managers to the resource manager tables and manually instruct the Topology Manager to remove the resources from the resource tables. It will allow the operator to change any parameter in the setup database for the program.

Detailed Description Text (39):
When the Topology Manager is started, it reada its setup database table. It will then run the synchronizing databases algorithm described in section 3.2.2 of this document. If the other Topology Manager is not available or indicated an non-operational status, the current Topology Manager will poll the resource managers in the Resource Name Table of the resource database to see if they are active and

operational. The Topology Manager will then query each of the resource managers that report in using a streams count request message. The Topology Manager will build its Resource Count Table based on the replies. The Topology Manager will then go on line by sending a `HereIAm` message to the Scheduler with an operational status.

Detailed Description Text (45):
This operation is described in conmjunction with FIG. 3. When the publisher again contacts the Scheduler to start the presentation, the Scheduler sends a Resource Request message to the Topology Manager. Block 100. The Topology Manager will check the Resource Count Table in the Topology Database to find the required stream resources of the type requested. Block 102. For PowerVU this will be NetShow streams. If any streams are available, the Topology Manager will proceed to allocate them to the event. Block 104. The Topology Manager will first create an Event Table entry in the Topology Database for the event indexed by the unique EventID. It will then check if the web site has been created during the scheduling session. It will note the URL in the Event Table entry in the Topology Database. Block 106.

Detailed Description Text (46):
If a firewall tunnel is needed and indicated in the Request Resources message, the Topology Manager will locate the Firewall Server Manager in the Resource Name Table of the Topology Database. It will then send a Request Firewall Tunnel Server message to the Firewall Tunnel Server. The Firewall Tunnel Server Manager will respond with a Firewall Tunnel Acknowledge message containing both the client connection information and the recaster connection information. Block 108.

Detailed Description Text (47):
The Topology Manager will find the Recaster Manager in the Resource Names Table. It will then send a Recast Request Server message to the Recast Manager passing the firewall connection information and the recaster connection requirements in the request. Block 110. The Recaster Server Manager will send a Recaster Acknowledge message indicating the number of connection allocated and the address of the connections obtained from the Name Server. Block 112. The Topology Manager will create an entry in the Event Resource Allocation Table for the resources obtained from the Recaster Server Manager and will update the Resource Count Table for the assigned resources. Block 114. The Topology Manager will continue requesting resources from all the listed Recaster Server Managers until it fills its requirements or runs out of resources.

Detailed Description Text (48):
The Topology Manager will then proceed to request streams from the Title Managers based on the requested amount or the amount it can service based on the recaster services it obtained. Block 116. The Topology Manager will request the streams from the Title Managers using the Assigning Resources algorithm described above. The Topology Manager will send a Request Streams message to each Title Manager in turn. It will check each Streams Acknowledge message to see that it got the streams that it requested. It will make an entry in the Event Resource Allocation Table for each assigned resource from each Title Manager. Block 118. It will continue requesting stream resources from the Title Manager until the request is satisfied or until the resources are completely assigned. The Topology Manager will update the Resource Count Table with each assignment.

Detailed Description Text (49):
After the resources have been obtained, the Topology Manager will send a Resource Return message to the Scheduler who will relay the information to the Publisher. All messages from this session will be forwarded to the other Topology Manager, if it is available, to keep it in sync with the network. The Topology Manager will continue to receive connection information messages from the Title Managers during the event. It will forward the information to the Scheduler. Block 120 and 122.

Detailed Description Text (62):
The Topology Manager receives scheduling messages from the scheduler that request resources for a presentation event. The Topology Manager schedules the resources and replies with URL addresses needed to connect to the resources.

Detailed Description Text (114):
This message is used to indicate the continued operation and status of a resource. It is sent to interested components when the resource manager is started and is resent within a predetermined time limit there after.

Detailed Description Text (118):
This message is used by the Topology Manager at startup to request that the running Topology Manager copy its current resource database (Topology.mdb) to its resource database.

Detailed Description Text (126):
This message is used to request that resources be allocated to an event by the Topology Manager.

Detailed Description Text (134):
This message is used to request count of available stream resources from the managers.

Detailed Description Text (136):
This message is used to return count of available stream resources from the managers.

Detailed Description Text (177):
The resource name table contains the internet names of all the systems resources in the InterVU network. This table is used by the Topology Manager to poll for available resources. The initial entries are setup and maintained by the operator via the administrator web page.

Detailed Description Text (181):
The Resource Count Table contains the use and availability counts for this resource type controlled by this manager.

Detailed Description Text (184):
Event Resource Allocation Table

Detailed Description Text (185):
The Event Resource Allocation Table contains the counts of all resources allocated to each event on progress.

Detailed Description Text (196):
The Status View home page will contain a pictorial view of the components of the system with use and availability summaries. Clicking on a component pictorial will load the detail status page for that component. Clicking on the event icon will produce a list of events currently running. Clicking on the event name will produce a report of resources allocated to and used by the event. The Status View home page will contain the entry point to the Manual Operation home page.

Detailed Description Text (198):
The Manual Operation home page will contain pictorial representations for the various database tables that can be edited by the operator and for the messages he can compose to allocate or release resources. The operator may edit any of the operational tables created by the Topology Manager. The operator will be warned when editing tables that might be in use and could cause system problems. The operator will be able to add, disable or delete resources at any time. The system

will attempt to automatically reallocate any needed resources that are disabled or deleted.

Detailed Description Text (257):
To communicate the request for system resources to the Topology Manager, the Event Reservation script will write a Web Request record to the EventMsg table. This table is scanned by the Scheduling System Agent for both outgoing Web Request messages, and incoming Response messages from Topology Manager. The Scheduler System Agent, therefore, acts as the arbitrator between the Topology Manager messaging system and the Active Server Page reservation system.

Detailed Description Text (264):
From the StartEvent ASP, a "ResReq" record is written to the EventMsg table. The Scheduler System agent forward the Resource Request to the Topology Manager. From here, the Topology Manager makes the appropriate connections between the Publisher machine (or encoding machine), and the InterVU network. The Topology Manager returns connection information to the Scheduler System Agent in a "ResReturn" message. This information is scanned by the StartEvent ASP and passed back to the publisher's browser so that broadcast setup can continue.

Detailed Description Text (300):
The PowerVU site will do the following: The PowerVU site will identify the customer from a cookie, if no cookie exists, the publisher must log in. The resource requirements will be retrieved from the InterVU database and passed to the InterVU network topology manager using ASP technology when the "Start" button on the ActiveX control is selected. The topology manager will configure the network for the broadcast and return the connection information to the ActiveX control. This will establish the ASF stream path through the firewall tunnel, from the encoder to the NetShow servers. When the publisher selects the "Transfer Files" button, the ActiveX control will FTP transfer the presentation documents from the local path to the presentation URL site. When the publisher selects the "Check Microphone" button, the ActiveX control will perform a microphone check When the publisher selects the "Check Camera" button, the ActiveX control will perform a closed loop video check for the user. When the publisher selects the "Connect Network" button, the ActiveX control will connect all of the network components. When the user clicks the "Start" button, the PowerVU site will signal PowerPoint to start the presentation. At the presenters option, the PowerVU Active X control will open a stay-on-top dialog box that will display viewer connection and timing information to the presenter. This dialog will have an end presentation button. When the presenter clicks this button, both PowerPoint and the PowerVU site will be informed.

Detailed Description Paragraph Table (7):
TABLE 7 Field Name Data Type Definition Length DWORD Length of complete message in bytes. MsgNum DWORD Message number. Defines message type. Sender DWORD Index of resource manager in resource manager table that sent message.

Detailed Description Paragraph Table (8):
TABLE 8 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 1 Sender DWORD Index of resource manager in resource manager table that sent message. Status DWORD Status of sender. Sender dependent definition. Zero indicates operational component with no errors.

Detailed Description Paragraph Table (9):
TABLE 9 Field Name Data Type Definition Length DWORD Length of forwarded message plus 12. MsgNum DWORD Message number = 2 Sender DWORD Index of Topology Manager in resource manager table that sent message. Message N/A Complete message to be forwarded.

Detailed Description Paragraph Table (10):

TABLE 10 Field Name Data Type Definition Length DWORD Length = 12 MsgNum DWORD Message number = 3 Sender DWORD Index of resource manager in resource manager table that sent message.

Detailed Description Paragraph Table (11):
TABLE 11 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 4 Sender DWORD Index of resource manager in resource manager table that sent message. Status DWORD Status = 0, successful, Status = 1, unsuccessful

Detailed Description Paragraph Table (12):
TABLE 12 Field Name Data Type Definition Length DWORD Length = 116 MsgNum DWORD Message number = 5 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publishers database. EventName ASCIIZ100 Name of event for the default lobby page.

Detailed Description Paragraph Table (13):
TABLE 13 Field Name Data Type Definition Length DWORD Length = 416 MsgNum DWORD Message number = 6 Sender DWORD Index of resource manager in resource manage table that sent message. EventID DWORD ID of event in publishers database. WebURL ASCIIZ100 URL of the event default lobby page. FtpURL ASCIIZ100 Ftp Address for .htm files. FtpLogin ASCIIZ100 Login name for ftp transfer. FtpPswd ASCIIZ100 Login password for ftp transfer.

Detailed Description Paragraph Table (14):
TABLE 14 Field Name Data Type Definition Length DWORD Length = 144 MsgNum DWORD Message number = 7 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publishers database. EventStart Date/Time Starting time and date of event EventFinish Date/Time Finish time of event. EventType DWORD Event type from publishers database. NumConnects DWORD Number of expected connections to event. FWTunnel Yes/No Firewall Tunnel Requested. Encoder ASCIIZ100 Encoder Address on internet.

Detailed Description Paragraph Table (15):
TABLE 15 Field Name Data Type Definition Length DWORD Length = 328 MsgNum DWORD Message number = 8 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. Status DWORD Status = 0 for successful allocation. 1 for partial, -1 for none NumConnections DWORD Actual count of connections allocated. ConnectAdr ASCIIZ100 Internet address of viewer connection. WebURL ASCIIZ100 URL of Web site for presentation slides. FWTunnelAdr ASCIIZ100 Internet Address of tunnel server. FWTunnelPort DWORD IP Port for tunnel server

Detailed Description Paragraph Table (16):
TABLE 16 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 9 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database.

Detailed Description Paragraph Table (17):
TABLE 17 Field Name Data Type Definition Length DWORD Length = 24 MsgNum DWORD Message number = 10 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of allocated connections. Viewers DWORD Number of actual connections.

Detailed Description Paragraph Table (18):
TABLE 18 Field Name Data Type Definition Length DWORD Length = 12 MsgNum DWORD Message number = 11 Sender DWORD Index of resource manager in resource manager table that sent message.

Detailed Description Paragraph Table (19):

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TABLE 19 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 12 Sender DWORD Index of resource manager in resource manager table that sent message. StreamCnt DWORD Number of available streams.

Detailed Description Paragraph Table (20):
TABLE 20 Field Name Data Type Definition Length DWORD Length = 130 MsgNum DWORD Message number = 13 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. EventType DWORD Event type from publisher database. NumConnections DWORD Number of requested connections. RecastAdr ASCIIZ100 Internet address of recaster. RecastPort DWORD IP port used for recaster. (need? Or part of Inet Adr.)

Detailed Description Paragraph Table (21):
TABLE 21 Field Name Data Type Definition Length DWORD Length = 24 MsgNum DWORD Message number = 14 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of requested connections. ActualNum DWORD. Number assigned this event.

Detailed Description Paragraph Table (22):
TABLE 22 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 15 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database.

Detailed Description Paragraph Table (23):
TABLE 23 Field Name Data Type Definition Length DWORD Length = 24 MsgNum DWORD Message number = 16 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of allocated connections. Viewers DWORD Number of actual connections.

Detailed Description Paragraph Table (24):
TABLE 24 Field Name Data Type Definition Length DWORD Length = 120 MsgNum DWORD Message number = 17 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of requested recaster connections. TunnelAdr ASCIIZ100 Internet address of Firewall Tunnel Server or customer encoder.

Detailed Description Paragraph Table (25):
TABLE 25 Field Name Data Type Definition Length DWORD Length = 24 MsgNum DWORD Message number = 18 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of requested connections. ActualNum DWORD Number of connections assigned.

Detailed Description Paragraph Table (26):
TABLE 26 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 19 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database.

Detailed Description Paragraph Table (27):
TABLE 27 Field Name Data Type Definition Length DWORD Length = 24 MsgNum DWORD Message number = 20 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. NumConnections DWORD Number of allocated connections. ActualNum DWORD Number of actual connections.

Detailed Description Paragraph Table (28):
TABLE 28 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 21 Sender DWORD Index of resource manager in resource manager

table that sent message. EventID DWORD ID of event in publisher database.

Detailed Description Paragraph Table (29):
TABLE 29 Field Name Data Type Definition Length DWORD Length = 228 MsgNum DWORD Message number = 22 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database. Status DWORD Status = 0 for successful allocation. 1 for unsuccessful. ClientConAdr ASCIIZ100 Internet address for client connection. ClientConPort DWORD IP Port for client connection. RecastAdr ASCIIZ100 Internet address recaster connection. RecastPort DWORD IP Port of recaster connection.

Detailed Description Paragraph Table (30):
TABLE 30 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 23 Sender DWORD Index of resource manager in resource manager table that sent message. EventID DWORD ID of event in publisher database.

Detailed Description Paragraph Table (35):
TABLE 35 Field Name Data Type Definition Length DWORD Length = 16 MsgNum DWORD Message number = 28 Sender DWORD Index of resource manager in resource manager table that sent message. Status DWORD Status of sender. Sender dependent definition. Zero indicates operational component with no errors.

Detailed Description Paragraph Table (39):
TABLE 39 Field Name Data Type Description NameIdx Number/Long Name index of resource manager owning counts. ResTypeIdx Number/long Index to resource type. Total Number/long Total amount of this type controlled by this manager. Reserved Number/Long Resources held in reserve. InUseOther Number/Long Resource in use. Controlled elsewhere. InUse Number/Long In use by this manager.

Detailed Description Paragraph Table (41):
TABLE 41 Field Name Data Type Description EventId Number/Long ID in Event Table of event using resources. NameIdx Number/Long Name index of resource manager owning resource. ResTypeIdx Number/long Index to resource type. InUse Number/Long Resources allocated to this event ConfirmedUsed Number/Long Number of resources reported to be in use.

CLAIMS:

1. A method of broadcasting at least one data stream over a data network, comprising the steps of: scheduling a broadcast of at least one data stream over a data network to a plurality of recipients; allocating network resources for the broadcast; setting up network interconnections for the broadcast; and automatically tracking at least one operation of at least one component in the data network to detect a component failure and, in response to a detected component failure, modifying network interconnections.

2. The method of claim 1 wherein the allocating step further comprises the step of monitoring usable resources to determine which resources may be allocated.

5. The method of claim 1 further comprising the step of determining whether resources are available in order to determine whether a recipient may receive the data stream.

6. A method of broadcasting at least one data stream over a data network, comprising the steps of: scheduling a broadcast of at least one data stream over a data network to a plurality of recipients; automatically allocating network resources for the broadcast; and automatically tracking at least one operation of at least one component in the data network to detect a component failure and, in response to a detected component failure, modifying network interconnections.

8. The method of claim 6 wherein the automatically allocating step further comprises the step of monitoring usable resources to determine which resources may be allocated.

11. The method of claim 6 further comprising the step of determining whether resources are available in order to determine whether a recipient may receive the data stream.

12. A system for broadcasting at least one data stream over a data network, the system comprising: a plurality of user terminals adapted to communicate with the data network; a server adapted to communicate with the data network for providing at least one data stream over the data network; a scheduler for scheduling a broadcast of the at least one data stream over the data network to the user terminals; and at least one topology manager for allocating network resources, setting up network interconnections for the broadcast, and modifying the network interconnections upon detecting component failures.